Global, Regional and Country Trends in Underweight and Stunting as Indicators of Nutrition and Health of Populations

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The inclusion of a nutrition indicator (weight-for-age) as measure of progress for the Millennium Development Goals (MDGs) did much to bring nutrition to the forefront of international debates. This indicator does little however, to provide us with clarity on the nature of the nutrition problems that must be addressed and specificity on the type of interventions that can be effective to address this. Stunting (low height-for-age) and wasting (low weight-for-height) provide indicators of different nutritional deficiency problems which may occur together or separately, the causes of which are well established. Whereas wasting is caused primarily by an immediate lack of calories and associated with food insecurity and hunger, stunting or chronic malnutrition is due to consistent low-level insufficient intake and may also be associated with micronutrient deficiencies and inappropriate infant feeding practices [1]. Wasted children are susceptible to disease, and the risk of mortality increases substantially with the severity of the problem. Stunting reduces later school attainment and income as adults. In addition, stunting during early life increases the risk of obesity and noncommunicable diseases in later life [2].

To track progress on addressing poor nutrition globally, regionally and in countries, we must track both healthy linear growth and appropriate accumulation and maintenance of (lean) body mass (or its absence, wasting). The *Lancet* series of 2008 [3] provided us with an excellent resource to track such indicators at a global level – information that will be updated within the coming months. The data show that globally, the estimated number of stunted children is decreasing, but is not on track to meet the goal of 100 million by 2025 (165 million) [4]. On the contrary, there has been very little change in the absolute number of children suffering from wasting since 2004.
Stunting and wasting also provide excellent indicators of inequity among regions and within countries, a problem that may be masked by other indicators, such as weight-for-age. For example, consistent with global trends from 1990 to 2010, the number of stunted children in Asia almost halved from 188.7 to 98.4 million, while in sub-Saharan Africa there was essentially no change in prevalence, and the number of stunted children actually increased over the same period from 45.7 to 55.8 million [4].

In Mexico, in 2012, wasting and underweight have ceased to be public health problems: even among the rural and indigenous populations, the prevalence of underweight is <5% [5] (fig. 1). Using these indicators, one might be inclined to claim victory in combating malnutrition in this country. That conclusion, however, would be very different using stunting. At a national level, the prevalence has declined substantially since 1988, from 26.9 to 13.6%, but national level data hide enormous variation, reflective of substantial inequity in the population (fig. 2).

As part of the MDGs, underweight was chosen as a nutrition indicator partly due to ease of measurement, the strong association with child mortality, and the existence of data for many, if not most countries globally. Just measuring underweight may lead to erroneous conclusions as demonstrated in the example of Mexico.

In renewing global targets, we must use indicators that reflect the nutritional problems we are concerned with and permit the selection of appropriate interventions to address them. This has been recognized with the inclusion of stunting in key global targets accepted by the World Health Assembly in 2012 [6]. Undoubtedly, height is more complex to

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**Fig. 1.** Prevalence of underweight, wasting and overweight in children <5 years of age from 4 nationally representative surveys in Mexico [5]. Z scores estimated using 2006 WHO growth reference standard. Underweight: weight-for-age <2 standard deviations (SD) below median; wasting: weight-for-height <2 SD below median; overweight: weight-for-height >2 SD above the median.
measure than weight but proven to be feasible. The cost of making erroneous conclusions about the nature of nutritional problems in countries and the programs required to address them is likely much greater than the cost of investing in the training and equipment required to ensure that height can be measured as part of national surveillance systems.

References